

REMARKS

In a final office action mailed January 13, 2003, claims 15-31 have been rejected. By this amendment, claims 22-26 have been cancelled. Claims 15-21 and 27-31 are pending in the application.

The office action indicates that §102(e) and §102(a) rejections are being maintained in the present office action. During a telephone discussion with Examiner White on June 11, 2003, Examiner White clarified that the §102(e) and §102(a) rejections were not being maintained. Applicants extend their gratitude to Examiner White for clarifying the rejections being put forth in the present office action and for taking the time to discuss the application.

The Invention

The invention relates to the oxidation of starch. Applicants have surprisingly discovered a process for oxidizing a starch that requires significantly less oxidizing agent than processes of the prior art. The process and resulting starch products of the present invention contain considerably less chlorine, which is desirable with respect to, for example, the environment.

The claimed process provides a starch product that is desirably viscous and stable. Thus, making the starch product produced by the claimed process superior to other oxidized starches when used in applications such as, for example, binders to paper coatings and

surface sizings, adhesives, protective colloids, coating of glass fibers in warp yarn sizings and food additives.

The claimed process recites two steps: (1) oxidation of a starch by treating the starch with an alkali metal hypochlorite; and (2) subjecting the oxidized starch product to an alkaline treatment.

Rejections Under §103(a)

Claims 15-20 have been rejected under §103(a) as being unpatentable over Wikstrom in view of Whitaker or Just. The Examiner recognizes that Wikstrom does not disclose an alkaline treatment performed at a pH higher than 10.5 for at least 15 minutes at a temperature of 20-50° C.

The Examiner cites Whitaker or Just as disclosing oxidation processes that utilize alkaline conditions as in the present invention. According to the office action, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the alkaline and sodium hypochlorite treatments of Whitaker and Just in the process of Wikstrom. Applicant respectfully submits that, upon combining the teachings of Wikstrom with Whitaker or Just, one would not arrive at the present invention.

As was explained during the telephone discussion with Examiner White, Applicants claimed process requires two steps:

(1) treating the APS with an alkali metal hypochlorite at a pH between 6.5 to 8.5 to form an oxidized starch product;

and

(2) subjecting the oxidized starch product to an alkaline treatment comprising keeping the starch product at a temperature of 20-50°C and a pH of higher than 10, for at least 15 minutes.

In contrast, both Whitaker and Just utilize alkaline conditions during the oxidation process. See, for example, col. 1, lines 40-43 of Whitaker, and col. 8, lines 21-28 of Just.

Page 4, lines 15-28 of the application explains that the use of alkaline conditions (pH greater than 8.5), during the oxidation reaction, adversely affects the reaction rate. In addition, the use of alkaline conditions during the oxidation process requires relatively high amounts of oxidizing agent (e.g. hypochlorite). These are the very problems in the prior art that are solved by the present invention.

In order to establish a *prima facie* case of obviousness, one of the criteria to be met is that the prior art references, when combined, must teach or suggest all of the claim limitations. See MPEP §2142.

Applicants' have demonstrated the importance of oxidizing the starch to form an oxidized starch product, then subjecting the oxidized starch product to an alkaline treatment.

Upon combining the teachings Wikstrom with Whitaker or Just, all of Applicants'

claimed limitations are not taught or suggested. Therefore, based on the foregoing discussion, Applicants' claimed invention is not obvious over Wikstrom in view of Whitaker or Just.

Applicants respectfully request that the rejection of claims 15-20 under §103 based on Wikstrom in view of Whitaker or Just be reconsidered and withdrawn.

Claims 21-27 and 30 have been rejected under §103 as being unpatentable over Wikstrom. In the interest of moving the application towards allowance, claims 22-26 have been cancelled. Accordingly, the rejection of claims 22-26 under §103 based on Wikstrom has been rendered moot.

In the office action, the Examiner contends that claims 21, 27 and 30 differ from Wikstrom by claiming process steps, however, "process limitations cannot impart patentability to a product that is not patentably distinguished over the prior art." [citations omitted.]

According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the starch of Wikstrom and expect similar finishing properties as the claimed invention.

Claims 28, 29 and 31 have been rejected under §103 as being unpatentable over EP 0799837 to Huizenga. According to the Examiner, Huizenga discloses compositions that

comprise an amylopectin potato starch that may be used in different products including food products and adhesives, which allegedly embraces the adhesive and food additive of claims 28 and 31, respectively. Applicant respectfully disagrees.

The two-step claimed process is not disclosed or suggested by Wikstrom or Huizenga. Moreover, the oxidized starch product obtained by the claimed process is superior to the starch products of both Wikstrom and Huizenga, as illustrated by the examples provided in the application and discussed below.

Importantly, using alkaline conditions during the oxidation reaction requires relatively high amounts of oxidizing agent (e.g. hypochlorite) to achieve the desired viscosity. As discussed above, using excessive oxidizing agent is undesirable, for example, for public health and environmental reasons..

Applicants have surprisingly discovered a two step process that utilizes significantly less oxidizing agent than the prior art. As mentioned above, the claimed process comprises first oxidizing the starch, then subjecting the oxidized starch to an alkaline treatment. The claimed process provides an oxidized starch having excellent properties, such as viscosity and stability.

The oxidized starch products provided by the claimed process have relatively low amounts of carboxyl groups, and thus, are viscous and stable. This being because low quantities of alkali metal hypochlorite are utilized. Starches produced according to the prior

art, such as in Whitaker and Just, have high amounts of carboxyl groups because large quantities of hypochlorite are used. Such oxidized starches are not as stable in viscosity. See page 13, lines 15-20.

Table II of the application illustrates the superiority of the claimed process as compared to the prior art. For example, oxidized amylopectin potato starches (APS) 1 and 3 were prepared at a neutral pH of 7.5 using a small amount of hypochlorite (10g), and were subject to an alkaline post-treatment. The viscosities of starches 1 and 3 after 20 hours were .99 and .94, respectively.

In contrast, starch 2 was oxidized using the same amount of hypochlorite as starches 1 and 3, but was not subjected to an alkaline post-treatment. The viscosity of starch 2 after twenty hours was .18.

The oxidized starch product of Wikstrom, which is not subjected to an alkaline post-treatment (akin to starch 2 discussed above), has a considerably lower viscosity stability as compared to a starch obtained by the present invention. Thus, an oxidized starch product of Wikstrom will not have similar properties (e.g. finishing agent) as a starch product obtained by the present invention.

Additionally, the starch product of Huizenga, which is not oxidized or subjected to an alkaline post-treatment, does not have the same or similar properties as a starch product obtained by the present invention. Therefore, there is no expectation that a starch product of

Huizenga will not have similar dispersive properties as a starch product obtained by the present invention.

Accordingly, Applicant respectfully requests that the rejections under §103 of claims 21-27 and 30 based on Wikstrom, and claims 28, 29 and 31 based on Huizenga, be reconsidered and withdrawn.

In light of the foregoing amendments and remarks, Applicants respectfully submit that the application is now in condition for allowance. If the Examiner believes a telephone discussion with the Applicant's representative would be of assistance, she is invited to contact the undersigned at her convenience.

Respectfully submitted,



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